

New Claims

5 1. A planetary gearset provided with a sun gear (12), a
ring gear (13), and a carrier (15) that rotatably retains
a plurality of pinion gears (14) arranged between the sun
gear and the ring gear, as elements, in which one of the
elements (e.g. carrier 15) is a fixed element and another
10 element is a rotating element, the planetary gearset
transmitting torque between that rotating element and an
external member provided eccentric with respect to the
rotating element, characterised in that:

15 the fixed element (15) is retained so as to be able
to move without rotation in a predetermined radial
direction of a load (F) from the transmission of torque
between the rotating element (13) and the external member
(19), and the load (F) from the transmission of torque
20 between the rotating element and the external member is
received by a fixed portion (16) that rotatably retains
said rotating element (13).

2. A planetary gearset according to claim 1,
25 characterised in that the fixed element (15) is retained
by coupling means in the form of a grooved spline in such
a way that it is allowed to move without rotation in said
predetermined radial direction parallelly to said load
(F), wherein this radial movement is allowed to such
30 extent that the load (F) from the transmission of torque
between the rotating element and the external member is
received through a reaction force (F') of the same size
as the load (F) by said fixed portion (16).

35 3. A planetary gearset comprising:

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a rotating element which is one element from among a sun gear (12), a ring gear (13), and a carrier (15) that rotatably retains a plurality of pinion gears (14) arranged between the sun gear (12) and the ring gear (13), and which transmits torque between said element and an external member (19) provided eccentric with respect to said element; and

a fixed element (e.g. carrier 15) which is one element from among the sun gear, the ring gear, and the carrier, said element being an element other than the rotating element, which is retained so as to be able to move without rotation in a predetermined radial direction of a load (F) from the transmission of torque between the rotating element (13) and the external member (19), and which is constructed such that the load (F) from the transmission of torque between the rotating element (13) and the external member (19) is received by a fixed portion (16) that rotatably retains that rotating element (13).

4. A planetary gearset according to claim 3, characterized in that said fixed element is retained by coupling means in the form of a grooved spline in such a way that it is allowed to move without rotation in said predetermined radial direction parallelly to said load (F), the construction being such that this radial movement is allowed to such extent that said load (F) is received through a reaction force (F') of the same size as the load (F) by said fixed portion (16).

5. The planetary gearset of one of the claims 1 to 4, wherein for allowing the rotating element to rotate there is provided a permanent gap adjacent to said rotating element (ring gear 13).

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6. The planetary gearset of one of the claims 1 to 5, wherein there is provided a permanent gap between said rotating element (ring gear 13) and a bearing (17) therefor.

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7. The planetary gearset according to one of the claims 1 to 6, wherein for allowing the fixed element (15) to move without rotation in said predetermined radial direction a grooved spline (20) is provided between said
10 fixed element (15) and a casing (16).

8. The planetary gearset according to one of the claims 1 to 7, characterised in that the fixed element (e.g. carrier 15) is retained on said fixed portion (16) via an
15 elastic member.

9. The planetary gearset according to any one of claims 1 through 8, characterised in that the fixed element is the carrier (15) and the rotating element is the ring
20 gear (13).

10. The planetary gearset of one of the claims 1 to 9, wherein said external gear is a counter gear (19), said rotating element is a ring gear (13) and said ring gear
25 is meshed with pinion gears (14).

11. The planetary gearset of claim 10, wherein external teeth (18) of said ring gear (13) are meshed with said counter gear (19).
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12. A planetary gearset in which a plurality of pinion gears (14) are arranged in a circumferential direction between a sun gear (12) and a ring gear (13) which are on the same rotational axis, with these pinion gears (14)
35 being rotatably mounted to a carrier (15) which is fixed so as not to rotate, the planetary gearset transmitting

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torque between one of the sun gear (12) and the ring gear (13), and a counter gear (19) which is eccentric with respect to the sun gear (12) and the ring gear (13), characterised in that:

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said ring gear (13) meshes with said pinion gears (14) on the one hand and with its external teeth (18) with said counter gear (19) so that torque is transmitted between said counter gear (19) and said ring gear (13);
10 wherein;

said pinion gears (14) are arranged away, in the circumferential direction, from a location (P) at which torque is transmitted between said ring gear (13) and said counter gear (19).

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13. A planetary gearset comprising:

a sun gear (12);

20 a ring gear (13) arranged on the same axis as the sun gear (12);

a counter gear (19) that transmits torque to said ring gear (13) via external teeth thereof and which is
25 arranged eccentric with respect to said sun gear (12) and said ring gear (13);

a plurality of pinion gears (14) provided between said sun gear (12) and said ring gear (13) and meshing
30 with those gears (12, 13); wherein

said pinion gears (14) are arranged away from, in a circumferential direction, a location (P) at which torque is transmitted between said ring gear (13) and said
35 counter gear (19); and wherein

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a carrier (15) rotatably retains said pinion gears (14) and is disposed so as not to rotate.

14. The planetary gearset according to claim 12 or 13, characterised in that the pinion gears (14) are arranged such that the location (P) at which torque is transmitted lies between two of the pinion gears.

15. A planetary gearset in which a plurality of pinion gears (14) are arranged in a circumferential direction between a sun gear (12) and a ring gear (13) which are on the same rotational axis, with these pinion gears (14) being rotatably mounted to a carrier (15) which is fixed so as not to rotate, the planetary gearset transmitting torque between one of the sun gear (12) and the ring gear (13), and an external member (19) which is eccentric with respect to the sun gear (12) and the ring gear (13), characterised in that:

all pinion gears (14) are arranged so as to be concentrated in an area near, in the circumferential direction, a location (P) at which torque is transmitted between one of the sun gear (12) and the ring gear (13), and the external member (19) and are excluded from an area away from that location (P).

16. A planetary gearset characterised by comprising:

a sun gear (12);

a ring gear (13) arranged on the same axis as the sun gear (12);

an external member (19) that transmits torque between one of the sun gear (12) and the ring gear (13), and the external member (19), and which is arranged

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eccentric with respect to the sun gear (12) and the ring gear (13);

5 a plurality of pinion gears (14) provided between the sun gear (12) and the ring gear (13), with all of the pinion gears (14) being arranged so as to be concentrated in an area near, in the circumferential direction, a location (P) at which torque is transmitted between one of the sun gear (12) and the ring gear (13), and the
10 external member (19) and to be excluded from an area away from said location (P); wherein

15 a carrier (15) rotatably retains said pinion gears (14) and is disposed so as not to rotate.

17. The planetary gearset according to claim 15 or 16, wherein said area is the half of said carrier (15) adjacent to said location (P).

20 18. The planetary gearset according to claim 17, wherein said pinion gears (14) are equidistantly distributed over an angle of 180°.

25 19. The planetary gearset according to any one of claims 15 through 18, characterised in that the fixed element is the carrier (15) and the rotating element is the ring gear (13).

30 20. The planetary gearset of one of the claims 15 to 19, wherein said external gear is a counter gear (19), said rotating element is a ring gear (13) and said ring gear is meshed with pinion gears (14).

35 21. The planetary gearset of claim 20, wherein external teeth (18) of said ring gear (13) are meshed with said counter gear (19)

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22. The planetary gearset according to any one of claims 9 through 21, characterised by further comprising:

5 a plurality of pinion pins (26) rotatably retained on the pinion gears (14) via bearings (27), the pinion pins being fixed to the carrier;

10 an oil path (34) that connects axial ends of the pinion pins (26), from the axial end of the pinion pin on an upper level side to the axial end of the pinion pin on a lower level side in that order, the oil path being formed on the axial end side of the pinion pins so as to lead lubricating oil that runs down from above; and

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an oil sump (35) that is formed in a location corresponding to the axial end of at least one of the pinion pins (26), and into which the lubricating oil that runs down the oil path runs, the oil sump collecting this lubricating oil, and being intercommunicated with the bearing of the at least one of the pinion pins.

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23. The planetary gearset according to any one of claims 9 through 21, characterised by further comprising:

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a plurality of pinion pins (26) rotatably retained on the pinion gears (14) via bearings (27), the pinion pins being fixed to the carrier (15);

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a plurality of oil holes (28) extending from the axial ends of the pinion pins to the bearings (27);

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an oil path that connects open ends of the oil holes from the open end of the oil hole on an upper side to an open end of the oil hole on a lower side in that order, the oil path being formed on an axial end side to which

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the oil holes (28) of the pinion pins open so as to lead lubricating oil that runs down from above; and

an oil sump (35) formed in a location corresponding to the open end of at least one of the oil holes (28), into which the lubricating oil that runs down the oil path runs, the oil sump collecting this lubricating oil, and being intercommunicated with the at least one of the oil holes.

24. The planetary gearset according to claim 19 or 23, characterised in that a plurality of the oil sumps are formed, and one of those oil sumps is formed with a different lubricating oil collecting capacity than another of the oil sumps.

25. The planetary gearset according to any one of claims 22 through 24, characterised by further comprising:

a first rotating body that transfers the lubricating oil by rotating; and

a second rotating body that retains the lubricating oil transferred by the first rotating body and transfers, by rotating, that lubricating oil to a portion requiring lubrication provided at an upper level end of the oil path.

26. The planetary gearset according to claim 25, characterised in that the second rotating body has formed therein a recessed portion that retains the lubricating oil.

27. The planetary gearset according to claim 25 or 26, characterised by further comprising:

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a transfer portion that temporarily retains the lubricating oil in at least one of a path that transfers the lubricating oil from the first rotating body to the second rotating body and a path that transfers the lubricating oil from the second rotating body to the portion requiring lubrication.

28. The planetary gearset according to claim 27, characterised in that the transfer portion is a portion that picks up the lubricating oil adhered to at least one end face of one of the first rotating body and the second rotating body.

29. The planetary gearset according to claim 27 or 28, characterised by further comprising:

a pushing out mechanism that pushes the lubricating oil retained in at least one of the first rotating body and the second rotating body out in an axial direction of the rotating body, and leads that lubricating oil to at least one path from among the path that transfers the lubricating oil from the first rotating body to the second rotating body and the path that transfers the lubricating oil from the second rotating body to the portion requiring lubrication.

30. The planetary gearset according to any one of claims 25 through 29, characterised in that an upper level edge of the portion requiring lubrication (105) is higher than an upper edge of the first rotating body.

31. The planetary gearset according to any one of claims 25 through 29, characterised in that a rotation speed of the second rotating body is faster than a rotation speed of the first rotating body.

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32. The planetary gearset according to any one of claims 25 through 31, characterised in that:

5 the sun gear, the ring gear, and the pinion gears are rotating members for transmitting power between a driving force source and a wheel; and

10 the first rotating body is coupled with one of the sun gear and the ring gear and is submersed in a main lubricating oil sump.

33. The planetary gearset according to any one of claims 1 through 21, characterised by further comprising:

15 a first rotating body that transfers lubricating oil by rotating; and

20 a second rotating body that retains the lubricating oil transferred by the first rotating body and transfers, by rotating, that lubricating oil to a portion requiring lubrication provided at an upper end of the rotating element.